MULTIMEDIA UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

# FINAL EXAMINATION

**TRIMESTER 1, 2015/2016**

## PBM0045 – MATHEMATICS

(Foundation in Management)

17 October 2015
2.30 p.m. – 4.30 p.m.
(2 Hours)

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**INSTRUCTIONS TO STUDENT**

1. This question paper consists of 2 pages with **FOUR** questions.

2. Attempt **ALL** four questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.

**Question 1 (25 Marks)**

a. Simplify the following fraction:

$$\frac{x+1}{x-1}-\frac{x-1}{x+1}$$ [4 marks]

b. Factorize the following expression completely.

$$(x+4)^3(x-2)+(x+4)^2(x-2)^2$$ [4 marks]

c. Solve the equation $\sqrt{2x+3}-4=0$. [5 marks]

d. Solve the inequality $3x-\frac{1}{3}\leq\frac{5}{2}x$. [4 marks]

e. The daily profit for the computer department of a store from the sale of notebooks is given by

$$f(x)=-x^2+18x+144$$

where $x$ is the number of notebooks sold. Find the vertex and intercepts of this function. [8 marks]

**Question 2 (25 Marks)**

a. The sum of the first three consecutive terms of an arithmetic progression is 27 and the common difference is 5.

i. Find the fourth, the seventh and the twelfth term of this progression. [5 marks]

ii. Given the $n$th term is 104. Find the value of $n$. [2 marks]

b. The third term and the sixth term of a geometric progression are 108 and 2916 respectively. Find the first term and the common ratio. [6 marks]

c. Solve the following system of linear equations by using the inverse of coefficient matrix.

$$\begin{aligned}3x-2y+z&=5\\4x-5y-z&=-1\\3x+2y-z&=4\end{aligned}$$ [12 marks]

**Continued...**

**Question 3 (25 Marks)**

a. Using Product rule, differentiate $f(x) = (3x - x^2)(3 - x - x^2)$.
Simplify your answer. [5 marks]

b. Using Quotient rule, differentiate $f(x) = \dfrac{x+2}{x-1}$.
Simplify your answer. [4 marks]

c. If $y = (5u+6)^3$ and for $u = (x^2+1)^4$, find $\dfrac{dy}{dx}$ when $x = 0$. [5 marks]

d. Find an equation of the tangent line to the function $y = \dfrac{1}{x^2}$ at point $\left(2, \dfrac{1}{4}\right)$.
[6 marks]

e. If the total-cost function of a manufacturer is given by

$$c = \frac{6q^2}{q+2} + 6000$$

Find the marginal-cost function $\dfrac{dc}{dq}$. Simplify your answer. [5 marks]

**Question 4 (25 Marks)**

a. Evaluate each of the following integral:

i. $\int (2x^3 - \sqrt{5})(2x^3 + \sqrt{5})\, dx$ [2 marks]

ii. $\int \left(\dfrac{1}{3x^2} - \sqrt[3]{x} + 3x^2\right) dx$ [3 marks]

iii. $\displaystyle\int_1^2 \frac{2(x+2)}{(x^2+4x)^3}\, dx$ [7 marks]

b. Given $\displaystyle\int_0^1 mx^2(x^2+m)\, dx = \frac{12}{5}$, find the value of constant $m$ ($m > 0$).
[7 marks]

c. Let $C(q)$ denote the total cost of producing $q$ units of a product at a certain factory. The marginal cost is given by the derivative $\dfrac{dC}{dq} = 4(q-3)^2$. By how much will the total manufacturing cost increase if the level of production is raised from 10 to 20 units.
[6 marks]

**End of page**